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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/001,235	11/13/2001	S. Thomas Autrey	23-59243	9274

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EXAMINER	
ROSENBERGER, RICHARD A	

ART UNIT	PAPER NUMBER
2877	

DATE MAILED: 08/11/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/001,235	AUTREY ET AL.	
	Examiner	Art Unit	
	Richard A Rosenberger	2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 May 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-48,50 and 51* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) *12-14 and 34* is/are allowed.

6)☐ Claim(s) *1-11,15-33,35-48,50 and 51* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

1. Upon consideration of the appeal brief filed 20 May 2004, the finality of the previous office action is withdrawn and prosecution is reopened.

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 4, 15, 27, and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Cahen et al (US 4,533,252).

The reference shows a substrate (cell-housing 11).

The reference teaches at least one affinity mass (sample 14). The sample 14 of the reference can be filter paper on which the sample is deposited (column 5, lines 33-36); which is "a material capable of retaining a sample having one or more analytes or capable of retaining the analyte itself" for photoacoustic analysis, and is thus an affinity mass within the definition

of that term as used in the instant specification (page 3, lines 16-17). The sample cell is "attached to the filter paper" (Cahen et al, column 5, lines 34-35), and is thus "connected to the substrate".

There is at least one acoustic detector, which can be "a suitable transducer, such as a sensitive microphone" (column 2, lines 11-12) which received acoustic signals from the affinity mass. The instant specification discloses that the "acoustic detector" may be "any suitable acoustic detector, such as microphones or transducers" (page 14, line 2), thus the microphone of the reference is an "acoustic detector" within the meaning of the instant specification.

In the Cahen et al reference, glass plate 15 is a sealing plate.

The Cahen et al reference discloses the use of an amplifier connected to microphone; see column 3, lines 48-49.

Although the claims set forth the structure as an "array", the claims require no more than one sample; claim 1 required only "at least one affinity mass", as do claims 27 and 29. Thus for these claims the word "array" includes a single sample, which can be understood as a 1 by 1 array. Claim 15 requires an n by m matrix, which n and m are "whole numbers from about 2 to about 2000". As 1 is "about 2", so, particularly given the inclusion of other claims that include a single sample under the broad term "array", claim 15 reads on a single sample as in the reference.

5. Claims 1, 2, 4, 15, 27, 29, 30 and 37 are rejected under 35 U.S.C. 102(b) as being anticipated by Rosencwaig (US 4,028,932).

The reference shows a substrate (sample housing 13).

The reference teaches at least one affinity mass (sample 31). The sample 31 of the reference can be chromatographic paper (column 4, line 49) to perform chromatographic analysis (column 4, line 44); such chromatographic paper is "a material capable of retaining a sample having one or more analytes or capable of retaining the analyte itself" for photoacoustic analysis, and is thus an affinity mass within the definition of that term as used in the instant specification (instant specification, page 3, lines 16-17).

The reference teaches a microphone (21); . The instant specification discloses that the "acoustic detector" may be "any suitable acoustic detector, such as microphones or transducers" (page 14, line 2), thus the microphone of the reference is an "acoustic detector" within the meaning of the instant specification. A microphone is a transducer by the ordinary meaning of that term.

The sample is contained in a recess formed in the substrate; note the structure shown n figures 1 and 2 of the reference which clearly shows the recess.

The window 16 of the reference is a sealing plate.

The reference teaches the use of an amplifier connected to the microphone; preamplifier 31 is an amplifier.

The reference teaches chromatographic analysis by testing chromatographic paper (column 4, lines 41-59). In such chromatographic analysis the sample is an analyte dissolved in a solvent in the affinity mass (the chromatographic paper).

Although the claims set forth the structure as an "array", the claims require no more than one sample; claim 1 required only "at least one affinity mass", as do claims 27, 29 and 37. Thus for these claims the word "array" includes a single sample, which can be understood as a 1 by 1 array. Claim 15 requires an n by m matrix, which n and m are "whole numbers from about 2 to about 2000". As 1 is "about 2", so, particularly given the inclusion of other claims that include a single sample under the broad term "array", claim 15 reads on a single sample as in the reference.

6. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over either Cahen et al (US 4,533,252) or Rosencwaig (US 4,028,932), in view of Rosencwaig (US 3,948,345)

See above for a discussion of Cahen et al and Rosencwaig '932.

Claim 1 of Rosencwaig '345 contains the language "a chamber having internal walls which reflect both light ...so that direct or scattered light does not strike an internal wall which can produce a detectable periodic variation";

this is a teaching that the internal walls of a photoacoustic cell should be reflective to avoid absorption of light by the walls of the cell which can "produce a detectable periodic variation" which can interfere with the detection of the desired signal from the sample. It would thus have been obvious to ensure that the walls of the sample cells of Cahen et al and Rosencwaig be highly reflective in the manner taught by Rosencwaig '345 for the reasons given therein. When the materials chosen for the cell is not itself sufficiently reflective for this beneficial effect to be achieved, adding a reflective layer would have been obvious.

7. Claims 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Cahen et al (US 4,533,252) or Rosencwaig (US 4,028,932) in view of Patel et al (US 4,276,780).

See above for a discussion of Cahen et al and Rosencwaig.

Cahen et al and Rosencwaig use gas to couple the photoacoustic signal from the sample to the transducer. It is known in the art that solid materials can be used to couple the photoacoustic signal to a transducer, such as a piezoelectric transducer; see Patel et al, in which the transducer 16 can be a piezoelectric transducer (column 8, line 2). It would have been obvious to use such a solid coupling means, as in Patel, to couple the photoacoustic signal to the transducer with samples comprising an affinity mass as in Cahen et al and Rosencwaig because this is a known manner of constructing a

photoacoustic detection apparatus. It would have been obvious to use any known type of piezoelectric transducer, including one in the form of a thin-wall tube, for the piezoelectric detector of Patel.

8. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over either Cahen et al (US 4,533,252) or Rosencwaig (US 4,028,932).

See above for a discussion of Cahen et al and Rosencwaig '932. Neither Cahen et al not Rosencwaig discuss the relative sizes of the cross sectional areas of their transducers and the illuminated area of the sample. It would have been obvious to make the illuminated area on the samples any convenient size, including a size which is larger than the cross-sectional area of the transducer.

9. Claims 16, 17, 19, 21, rejected under 35 U.S.C. 103(a) as being unpatentable over Rosencwaig (US 4,028,932).

See above for a discussion of the Rosencwaig reference.

The Rosencwaig et al reference teaches that the sample can be "chromatographic paper, plate or film" (column 4, line 49). This teaches that is it known to test an analyte that is held within a matrix, or "affinity mass". It would have been obvious to use other known sorts of matrices, or "affinity masses" to hold the analyte of interest. Forming the matrix material in any known an convenient manner would have been obvious.

10. Claim18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rosencwaig (US 4,028,932) as applied to claim17 above, and further in view of Patel et al (US 4,276,780).

It is known in the art that solid materials can be used to couple the photoacoustic signal to a contact transducer, such as a piezoelectric transducer; see Patel et al, in which the transducer 16 can be a piezoelectric transducer (column 8, line 2). It would have been obvious to use such a solid coupling means, as in Patel, to couple the photoacoustic signal to the transducer with samples comprising an affinity mass as in Rosencwaig because this is a known manner of constructing a photoacoustic detection apparatus.

11. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over either Rosencwaig (US 4,028,932), in view of Rosencwaig (US 3,948,345)

See above for a discussion of Rosencwaig '932.

Rosencwaig '345, in claim 1, teaches that the internal walls of a photoacoustic cell should be reflective to avoid absorption of light by the walls of the cell which can "produce a detectable periodic variation" which can interfere with the detection of the desired signal from the sample. It would thus have been obvious to ensure that the walls of the sample cell of Rosencwaig be highly reflective in the manner taught by Rosencwaig '345 for the reasons given therein. When the materials chosen for the cell is not itself

sufficiently reflective for this beneficial effect to be achieved, adding a reflective layer would have been obvious.

12. Claims 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Cahen et al (US 4,533,252) or Rosencwaig (US 4,028,932) in view of Patel et al (US 4,276,780).

See above for a discussion of Cahen et al and Rosencwaig.

The Rosencwaig et al reference teaches that the sample can be "chromatographic paper, plate of film" (column 4, line 49), and the Cahen et al reference teaches the sample can be held on a piece of filter paper (column 5, lines 34-36) . The references thus teach that is it known to test an analyte that is held within a matrix, or "affinity mass". It would have been obvious to use other known sorts of matrices, or "affinity masses" to hold the analyte of interest.

Cahen et al and Rosencwaig use gas to couple the photoacoustic signal from the sample to the transducer. It is known in the art that solid materials can be used to couple the photoacoustic signal to a transducer, such as a piezoelectric transducer; see Patel et al, in which the transducer 16 can be a piezoelectric transducer (column 8, line 2). It would have been obvious to use such a solid coupling means, as in Patel, to couple the photoacoustic signal to the transducer with samples comprising an affinity mass as in Cahen et al and Rosencwaig because this is a known manner of constructing a

photoacoustic detection apparatus. It would have been obvious to use any known type of piezoelectric transducer, including one in the form of a thin-wall tube, for the piezoelectric detector of Patel.

13. Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over either Cahen et al (US 4,533,252) or Rosencwaig (US 4,028,932), in view of Patel et al (US 4,276,780) as applied to claim 31 above, and further in view of Rosencwaig (US 3,948,345).

Claim 1 of Rosencwaig '345 teaches that the internal walls of a photoacoustic cell should be reflective to avoid absorption of light by the walls of the cell which can "produce a detectable periodic variation" which can interfere with the detection of the desired signal from the sample. It would thus have been obvious to ensure that the walls of the sample cell of Rosencwaig be highly reflective in the manner taught by Rosencwaig '345 for the reasons given therein. When the materials chosen for the cell is not itself sufficiently reflective for this beneficial effect to be achieved, adding a reflective layer would have been obvious.

14. Claims 7, 9, 10, 22, 23, 26, 28, 38-48 and 50-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cahen et al (US 4,533,252) and Rosencwaig (US 4,028,932) taken together, in view of Watanabe et al (US 4,436,428), and additionally taken with Horiba et al (US 4,236,827).

Cahen et al and Rosencwaig et al both show that it is known in the are to perform photoacoustic analysis on an analyte held by a matrix, or an "affinity mass". Neither shows having multiple samples. In a similar and related apparatus, Watanabe et al teaches that photoacoustic analysis can be performed on analytes held in a matrix, or "affinity mass", and teaches that a plurality of samples, in a plurality of affinity masses, can be present and tested; see in particular figure 9, showing a many-to-one relation between samples and a transducer suing sequential illumination, and figure 6, showing a one-to-one relation between samples and transducers. Watanabe et al, in column 7, lines 5-10, teaches that two or more samples can be analyzed by such an arrangement.

While Watanabe et al, for his specific purposes, prefers a mass-flow type detection to detect the photoacoustic signals, both Cahen et al and Rosencwaig teach that microphones can also be used with analytes held in affinity masses such as filter paper or chromatographic paper, plates or films. Additionally, note Horiba et al, which in a related arrangement, teaches the art-recognized general equivalence and substitutability of the different types of detectors to detect the photoacoustic signal : "It is not necessary that the pressure change detecting means be a microphone type ... a mass-flow type, which detects gas flow occurring within the detector by a hot-wire anemometer, will do as well" (column 2, lines 12-16). Those in the art are familiar with both types of detectors for detecting photoacoustic signals, and

are, as shown by the references, aware that both can be usefully used with samples held in affinity masses.

15. Claims 8, 11, 35 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cahen et al (US 4,533,252) and Rosencwaig (US 4,028,932) taken together, in view of Watanabe et al (US 4,436,428), and additionally taken with Horiba et al (US 4,236,827), as applied to claims 7, 10 respectively for claims 8 and 11, above, and further in view of Rosencwaig (US 3,948,345).

See above for a discussion of the first four references.

Rosencwaig '345, in claim 1, teaches that the internal walls of a photoacoustic cell should be reflective to avoid absorption of light by the walls of the cell which can "produce a detectable periodic variation" which can interfere with the detection of the desired signal from the sample. It would thus have been obvious to ensure that the walls of the sample cells of Cahen et al and Rosencwaig be highly reflective in the manner taught by Rosencwaig '345 for the reasons given therein. When the materials chosen for the cell is not itself sufficiently reflective for this beneficial effect to be achieved, adding a reflective layer would have been obvious. As for claim 11, it is notes that, in the devices of Cahen et al and Rosencwaig '932, a highly reflective surface upon which the sample sits would reflect light away from the transducer, which in neither case is locate above the sample. Both Rosencwaig ('932) and Watanabe et al show placing the sample in a recess.

16. Claims 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cahen et al (US 4,533,252) and Rosencwaig (US 4,028,932) taken together, in view of Watanabe et al (US 4,436,428), and additionally taken with Horiba et al (US 4,236,827), as applied to claims 22 and 23 respectively, above, and further in view of Patel et al (US 4,276,780).

Cahen et al, and Rosencwaig, use gas to couple the photoacoustic signal from the sample to the transducer. It is known in the art that solid materials can be used to couple the photoacoustic signal to a transducer, such as a piezoelectric transducer; (Patel et al, column 8, line 2). It would have been obvious to use such a solid coupling means to couple the photoacoustic signal to the transducer with samples comprising an affinity mass as in Cahen et al and Rosencwaig because this is a known manner of constructing a photoacoustic detection apparatus. It would have been obvious to use any known type of piezoelectric transducer, including one in the form of a thin-wall tube, for the piezoelectric detector of Patel.

17. The art does not appear to teach or suggest a substrate having an array of affinity masses connected to an upper surface and a reflective plate connected to a lower surface; thus claims 12-14 and 34 are allowable. It does not appear that the teaching of Rosencwaig (US 3,948,345), that the components of the photoacoustic apparatus be reflective to avoid the effects of the light beam being absorbed by portions of the apparatus other than the

sample, would suggest to those in the art that the reflective plate be placed on the opposite side of the substrate supporting the samples because the light would thus have to pass through the supporting plate to reach and be reflected by the reflective plate and would thus not serve the purpose of avoiding possible absorption by the supporting substrate.

18. In order to expedite prosecution, the rejections over Watanabe et al alone have been withdrawn and new rejection have been made. The new rejections largely render the arguments in the brief moot. However, the Watanabe et al reference is still being used in some of the rejections above as a secondary reference. While it is correct both that a photoacoustic signal in air is comprised of several different and that Watanabe et al uses a different aspect of the total photoacoustic signal than does the specific examples given in the instant specification (such as a microphone), the preference of Watanabe et al for their particular detection method in their context does not remove from the art the knowledge, as set forth in Cahen et al and Rosencwaig '932, that analytes on or in a affinity mass can be usefully measured using the part of the photoacoustic signal detectable by a microphone or the like.

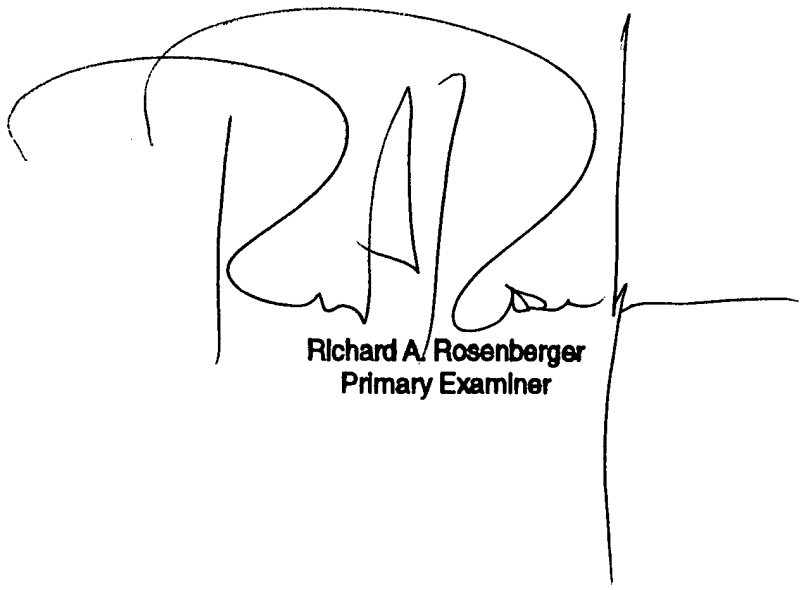
19. Kerr (US 3,811,782), like figure 9 of Watanabe et al, teaches a single photoacoustic cell with two sample or test areas in the cell which can be

separately illuminated to make photoacoustic measurements on two different sample areas (a reference clear area of the window and a coated area of the window).

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard A Rosenberger whose telephone number is (571) 272-2428. The examiner can normally be reached on Monday through Friday during the hours of 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr. can be reached on (571) 272-2059. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



R. A. Rosenberger
6 August 2004

Richard A. Rosenberger
Primary Examiner